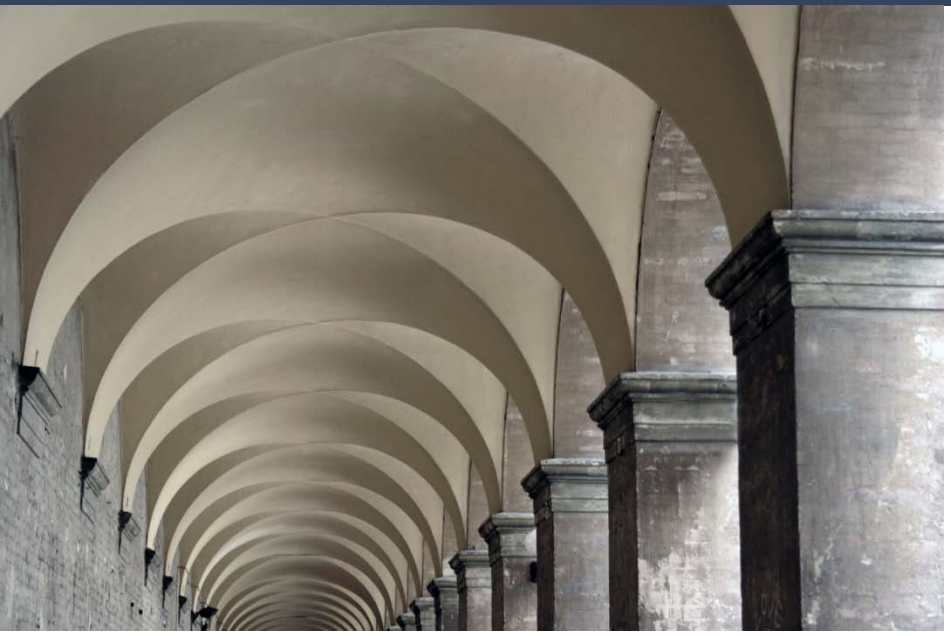
The Eyes Have It: Documenting the Use of Public Surveillance Cameras for Crime Control and Prevention



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Overview

- Theoretical underpinnings
- Overview of methodology
- Description of cameras and usage
- Data sources
- Findings from three sites (e.g., impact, spatial, and cost-benefit elements)
- Limitations and conclusions

Theoretical Underpinnings

- Why should public surveillance cameras prevent crime?
- Rational Choice Perspective
  - Criminals weigh costs/benefits of crime
  - Situational Crime Prevention: cameras = formal surveillance
- Public surveillance cameras increase risk of apprehension
  - Active monitoring enables LE to intervene on the spot
- Public surveillance cameras increases risk of detection
  - Video footage supports investigative efforts, identification of perpetrator
- What types of crimes should cameras prevent?
  - Street crimes of all types
  - Some argue less impact on violent crime
  - May prevent crime behind closed doors

Overview of Methodology

- Process Evaluation
  - Camera basics
  - Implementation, monitoring, and placement
- Impact Analysis
  - Structural Break Analysis
  - Differences-in-Differences
- Spatial Analysis
  - Density Mapping
  - Means Center
  - Weighted Displacement Quotient (WDQ)
- Cost-Benefit Analysis

Implementation Differences

City	**Baltimore**	**Chicago**	**Washington**
Number of Cameras	400+	2,000+ (access to over 8,000)	70+
Primary Camera Type	Overt PTZ	Overt PTZ	Overt PTZ
Privacy Policies	Less Restrictive	Less Restrictive	More Restrictive
Monitory Strategy	Mostly Active; Partially Centralized Dedicated Monitors	Mixed; Decentralized Non-Dedicated Monitors	Mostly Passive; Centralized Supervised Sworn Officers
Network Type	Primarily Wireless	Wireless	Mixed

Impact Analysis

- Structural Break Analysis
  - Detects significant changes
  - User aligns changes with implementation date(s)
  - Enables detection of incrementally implemented interventions
- Difference-in-Differences
  - Compares net change in crime in target area using control area to subtract out other changes at the same time
  - Assume other changes were identical between the treatment and control

- Searched for significant differences in average monthly crime counts within three areas:
  - (1) the target area of the camera (radius of 500 feet);
  - (2) at buffer zones of 500 feet (diffusion zone 500 feet beyond target area)
  - (3) at buffer zones of 1000 feet (displacement zone 1000 feet beyond target area);

- Matched comparison areas for each area selected
  - Land use, historical crime rates, and socio-economic measures to the target area before the intervention

Data Sources and Study Areas

Baltimore, MD

- Reported crime:
  - Total crime, violent crime, aggravated and simple assault, arson, burglary, inside and outside larceny, motor vehicle theft, murder, rape, and robbery
- Four areas: Downtown (CitiWatch area), Greenmount, North Avenue, and Tri-District
- Dates: 01/2003 through 04/2008

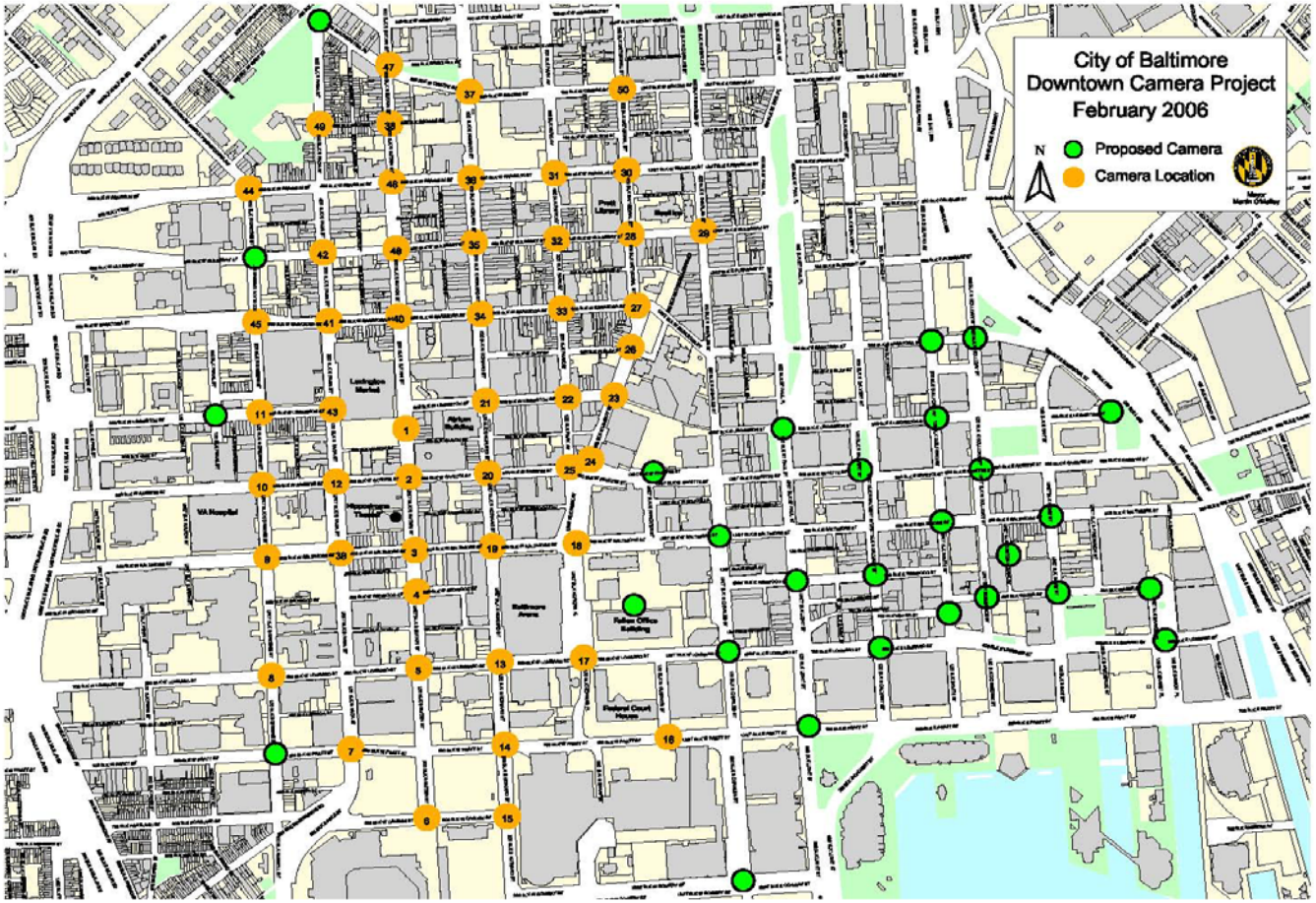
Chicago, IL

- Reported crime:
  - Total crime, violent crime, arson, burglary, drug, larceny, motor vehicle theft, prostitution, robbery, vandalism, weapon, other
- Two areas: Humboldt Park and West Garfield Park
- Dates: 9/2001 through 8/2006

Washington, DC

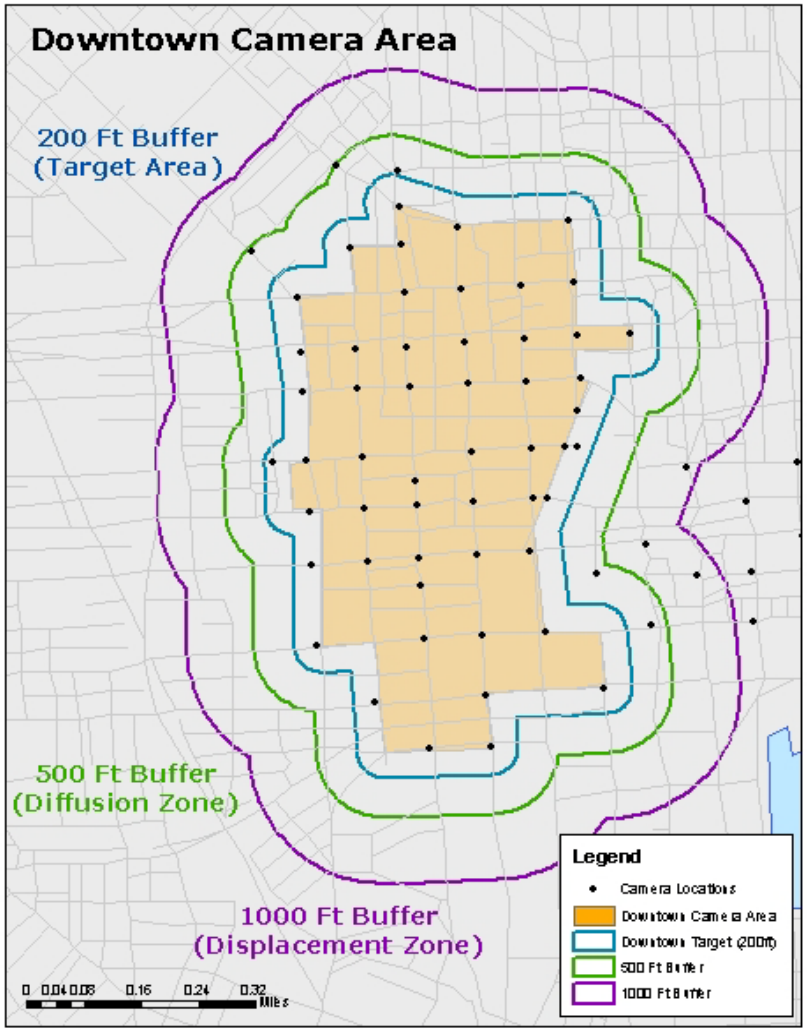
- Reported crime:
  - Total crime, violent crime, adw, arson, burglary, larceny, motor vehicle theft, murder, robbery, sexual assault, other
- Two areas: Individual Cameras and Clustered Cameras
- Dates: 01/2005 through 2/2009

City of Baltimore-Downtown

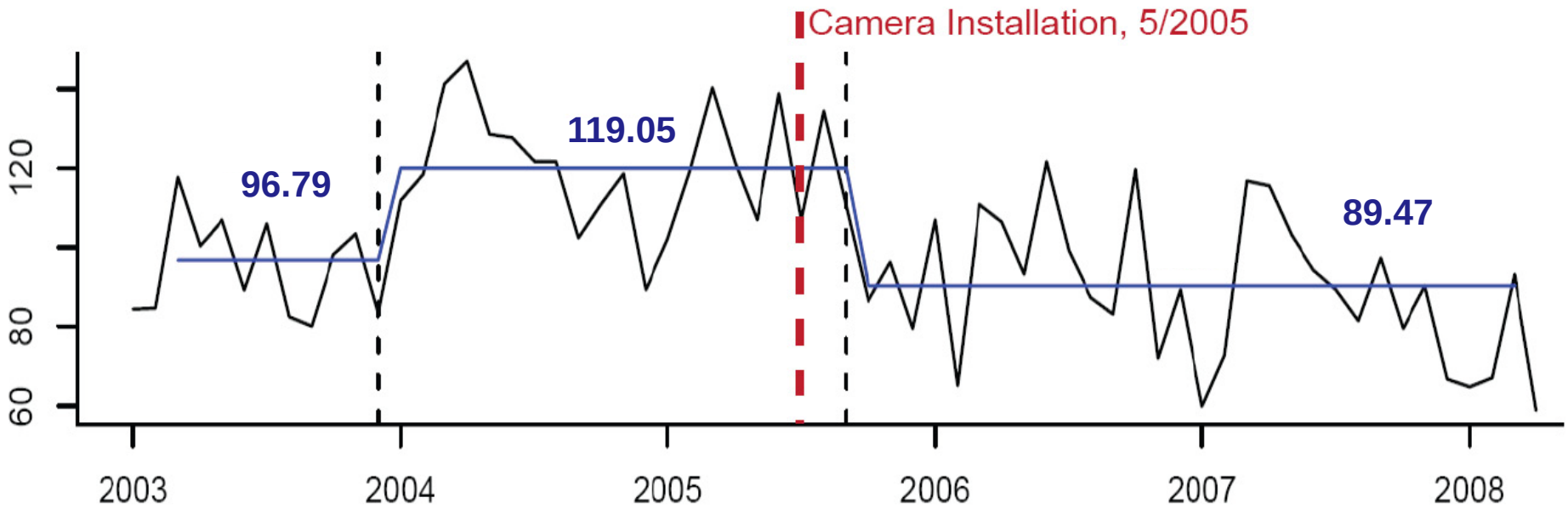


Baltimore CitiWatch Camera target, diffusion, and displacement areas

- **No appropriate comparison area for CitiWatch**



Example of Structural Break Analysis: All Offenses



Baltimore's Downtown CitiWatch Area

Significant Changes in Crime, Downtown Baltimore*

Crime	Time from Installation	Pre-Shift Mean	Post-Shift Mean	%Change
Larceny Inside	3 months	36.79	25.03	-31.97%
Larceny Outside	11 months	41.47	27.13	-34.58%
Violent	6 months	21.17	16.36	-22.72%
Total	4 months	119.05	89.47	-24.85%
1000-ft Buffer	5 months	82.83	58.38	-29.52%

*First set of cameras were installed in early May 2005; therefore, the intervention point was determined to be May 2005. The downtown extension cameras were not included in this analysis.

Baltimore's Greenmount Area

Significant Changes in Crime, Greenmount Area, Baltimore*

Crime Type	Area	Before	After	Change	Difference-in-Differences
All Crime	Treatment	64.00	50.76	-13.24	
	Comparison	40.42	35.39	-5.03	-8.22†

*Camera installation occurred in early August 2005; therefore, the intervention point was determined to be August 2005.
†Significant at $p<.05$.

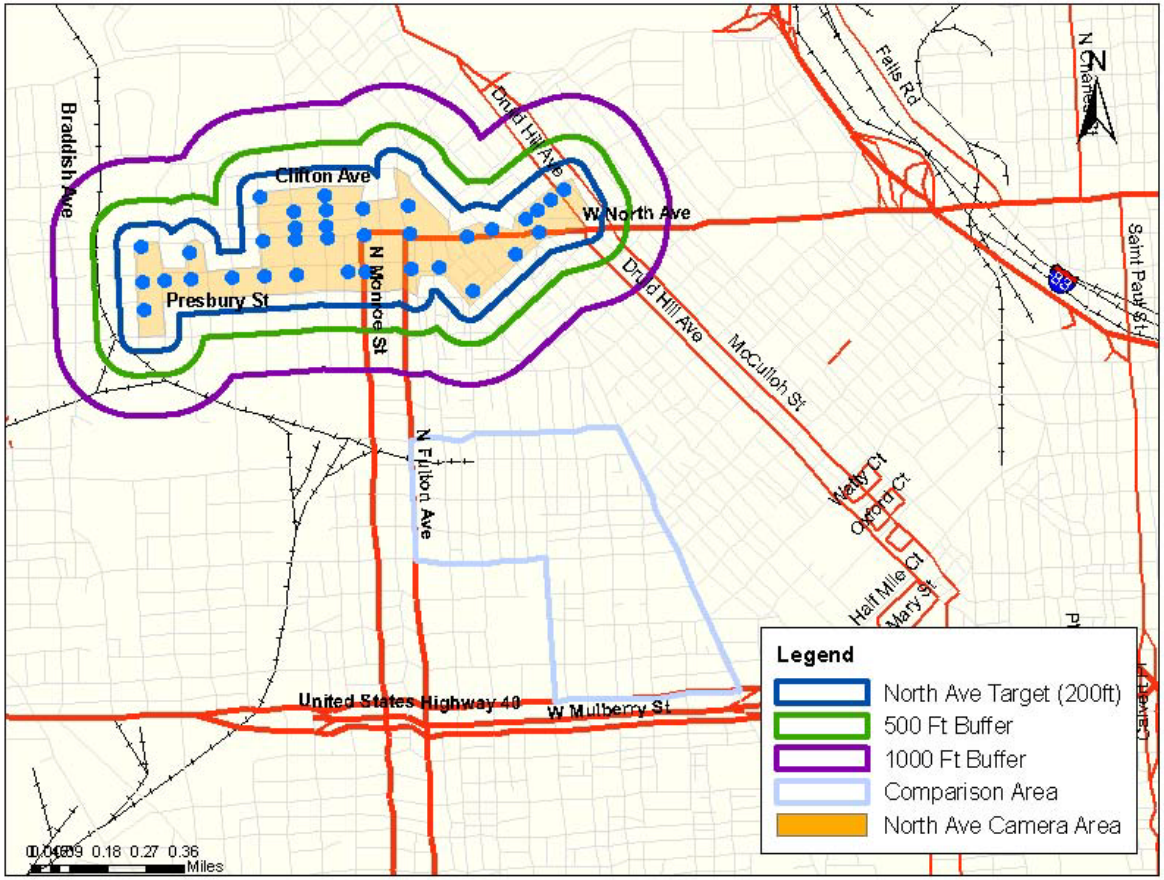
Baltimore's Tri-District Area

Significant Changes in Crime, Tri-District Area, Baltimore*

Crime Type	Area	Before	After	Change	Difference-in-Differences
All Crime	Treatment	37.61	29.12	-8.49	
	Comparison	32.53	36.38	+3.86	-12.35†
Larceny Inside	Treatment	3.39	1.54	-2.83	
	Comparison	1.97	1.65	-0.32	-1.54†
Robbery	Treatment	3.84	2.08	-1.77	
	Comparison	3.47	3.77	+0.30	-2.06†

*Camera installation occurred in early March 2006; therefore, the intervention point was determined to be March 2006.
†Significant at $p<.05$.

Baltimore's North Avenue Area



- **No significant findings**

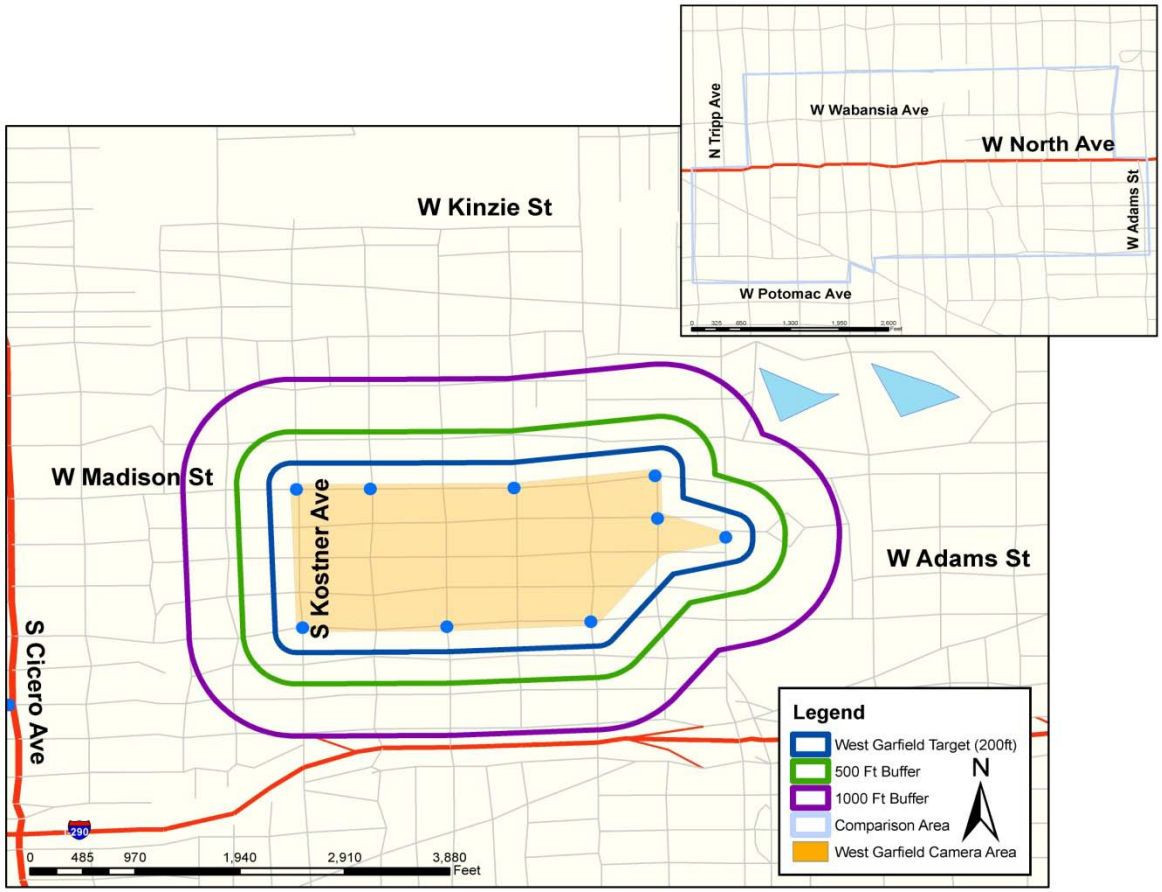
Chicago's Humboldt Park Area

Significant Changes in Crime, Humboldt Park, Chicago*

Crime Type	Area	Before	After	Change	Difference-in-differences
All Crime	Treatment	301.39	243.53	-57.86	
	Comparison	349.57	330.00	-19.57	-38.30†
Violent	Treatment	33.00	23.19	-9.81	
	Comparison	29.57	25.62	-3.95	-5.87†
Drug	Treatment	115.22	77.31	-37.91	
	Comparison	120.57	116.14	-4.43	-33.49†
Robbery	Treatment	11.52	8.53	-2.99	
	Comparison	11.43	11.61	+0.18	-3.17†
Weapons	Treatment	3.96	2.58	-1.37	
	Comparison	3.78	4.56	+0.77	-2.15†

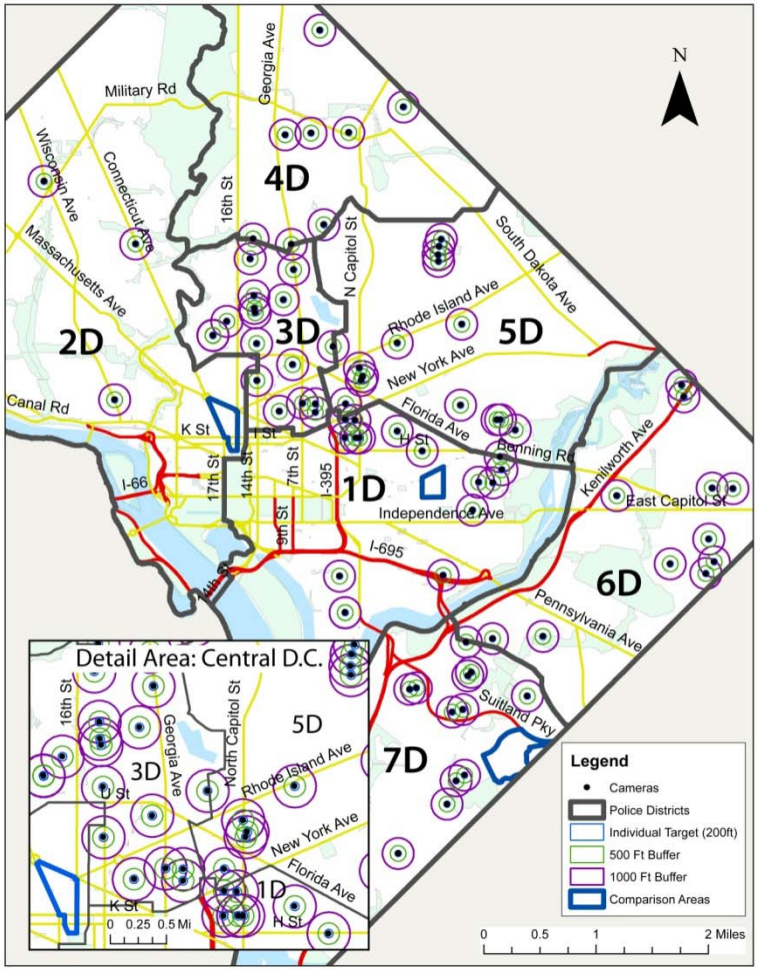
*First camera installation on July 31, 2003 and, therefore, intervention line inserted at August 2003.
†Significant at $p<.05$.

Chicago's West Garfield Park Area



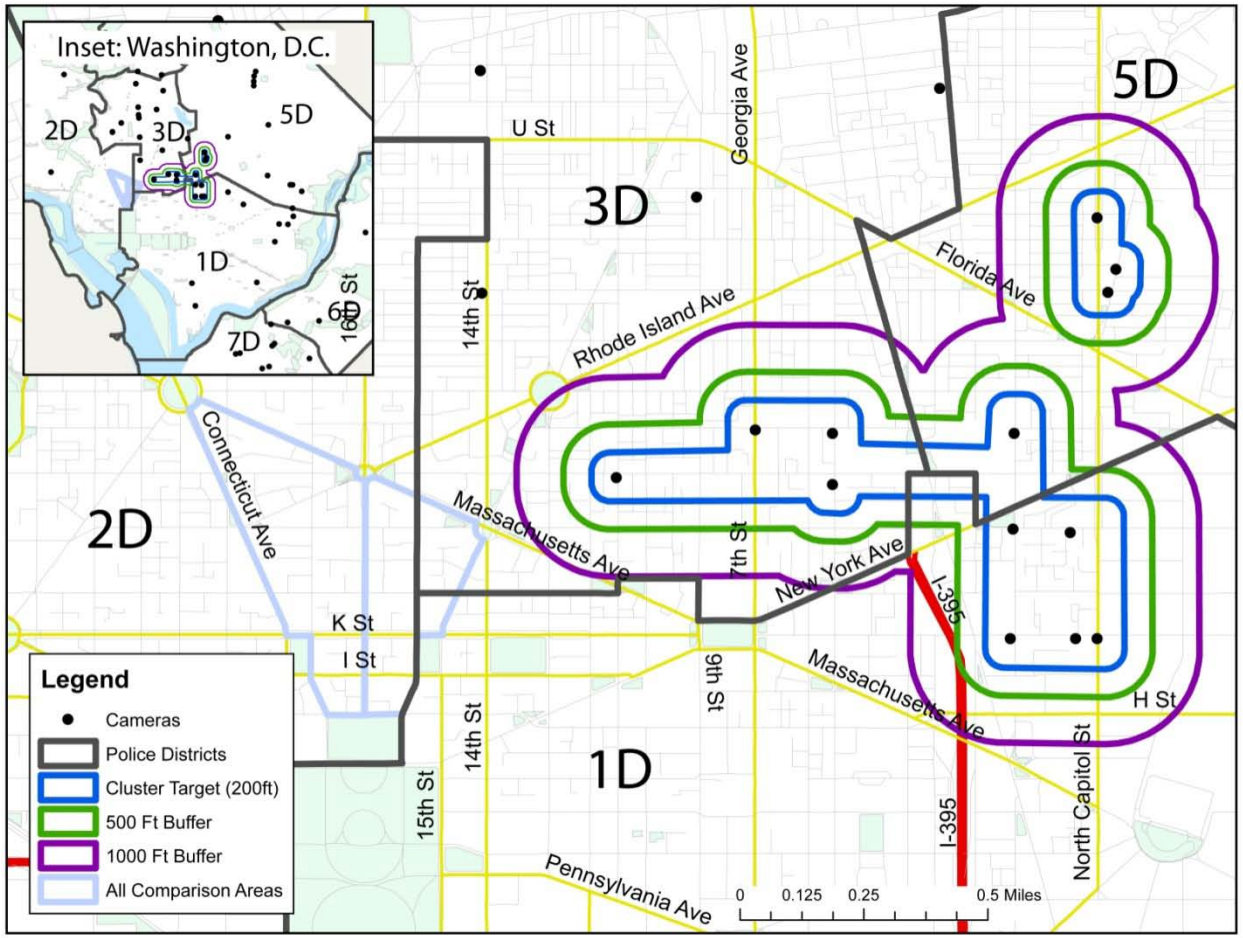
- **No significant findings**

DC's Individual Cameras



- Crime in each area pooled together (i.e., target, 500-ft, and 1000-ft buffers)
- No significant findings

DC's Cluster Camera Area



- 13 cameras in close proximity
- No significant findings

Crime Displacement and Diffusion of Benefits

- Spatial displacement of crime after camera installation
  - Crime moves outside viewshed of camera
  - Crime moves into similar crime target areas
- Diffusion of benefits following camera installation
  - Cameras have deterrent effect beyond viewshed
  - Distance at which cameras no longer influence crime

Costs and Benefits, Baltimore

- **Cost** of the Intervention
  - Initial Start-up Costs
    - Infrastructure
    - Installation
    - Equipment
  - On-Going Costs
    - Monitoring
    - Maintenance
    - Equipment

- **Benefits** of the Intervention
  - Averted Criminal Justice Costs
    - Law Enforcement
    - Court
    - Incarceration
  - Averted Victimizations
    - Tangible Costs
      - Medical and Mental Health Treatment
      - Lost Earnings
    - Intangible Costs
      - Pain and Suffering
      - Reduced Quality of Life

CBA Results:
Total Crime Costs and Benefits, Baltimore

- Total costs over observation period:
  - $8.06 million ≈ $224,000/month
- Benefits over observation period:
  - $12 million ≈ $334,000/month
- Benefit-Cost ratio (benefit per dollar cost):
  - $1.49

CBA Results: Total Crime Costs and Benefits, Chicago

- Total costs over observation period:
  - $6,845,000 ≈ $190,000/month
- Benefits over observation period:
  - $29.4 million ≈ $815,000/month
- Benefit-Cost Ratio (Benefit per Dollar Cost):
  - $4.29

CBA Considerations: Public Safety and Societal Benefits

- Above analyses incorporate public safety system & victim benefits
- Governments do not accrue benefits of averted crimes to victims in their budgets
- Considering public safety system benefits only:
  - Baltimore: from $334,000 per month to $237,000
    from $1.49 to $1.06
  - Chicago: from $815,000 per month to $533,000
    from $ 4.29 to $2.81

Summary and Limitations

- Cameras can have impact on crime
  - Question: Was there diffusion and/or displacement?
  - Caveat: are we sure it was the cameras?
- Why do they work in some neighborhoods and not others?
  - Active monitoring
  - Sufficient concentrations
  - Integration into LE/investigative activities
- Costs: careful consideration to planning and procurement activities; costs of cameras themselves are minimal compared to the costs of installation, maintenance, and monitoring
  - Caveat: less cost-beneficial when societal benefits are removed
- Cameras should supplement, not supplant

Questions?

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